

What is claimed:

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1. A digital x-ray imaging device comprising:

a top electrode layer;

a dielectric layer under the top electrode layer;

a sensor layer under the dielectric layer, comprising a photoconductive layer and a plurality of pixels, each pixel comprising a charge-collecting electrode;

a thin film transistor readout matrix connected to the charge-collecting electrodes; and

a variable power supply adapted to provide a range of voltages between the top electrode layer and the readout matrix.

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2. The digital x-ray imaging device of claim 1 wherein the variable power supply comprises a programmable power supply.

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3. The digital x-ray imaging device of claim 1 wherein the photoconductive layer comprises an element selected from the group consisting of: selenium, lead iodide, thallium bromide, indium iodide, and cadmium telluride.

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4. The digital x-ray imaging device of claim 3 wherein the photoconductive layer is about 100 to about 1000 microns thick.

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5. The digital x-ray imaging device of claim 4 wherein the photoconductive layer comprises a layer of selenium about 500 microns thick.

1                   6.     The digital x-ray imaging device of claim 1 wherein the power  
2     supply is adapted to provide a range of voltages with at least approximately a 2:1  
3     turndown ratio.

1                   7.     The digital x-ray imaging device of claim 5 wherein the power  
2     supply is adapted to provide a range of voltages between about 1.5 kV and about 3.0  
3     kV.

1                   8.     In a digital x-ray imaging device having a top electrode layer and  
2     a readout matrix, the improvement comprising a variable power supply adapted to  
3     provide a range of voltages between the top electrode layer and the readout matrix.

1                   9.     A method for providing a broad dynamic range for a digital x-ray  
2     imaging device comprising a top electrode layer; a dielectric layer; a sensor layer  
3     comprising a photoconductive layer and a plurality of pixels, each pixel comprising a  
4     charge-collecting electrode; a thin film transistor readout matrix connected to the  
5     charge-collecting electrodes; and a power supply for supplying a voltage between the  
6     top electrode layer and the readout matrix; the method comprising varying the voltage  
7     between the top electrode layer and the readout matrix to provide an acceptable signal-  
8     to-noise ratio over a greater range of exposures than provided at a single voltage.

1                   10.    The method of claim 9 further comprising using the method for  
2     non-destructive testing of one or more objects.

1                   11.    The method of claim 10 further comprising performing the non-  
2     destructive testing on an object selected from the group consisting of: a printed circuit  
3     board, a wax casting, a metal casting, a turbine blade, and a rocket cone.

1                   12.    The method of claim 9 comprising varying the voltage in a range  
2     between about 1.5 kV and about 3.0 kV.

1            13.    The method of claim 9 comprising using the digital imaging x-  
2    ray device with a range of x-ray energies from about 10 KeV to about 10 MeV.

1 14. The method of claim 9 comprising providing a signal-to-noise  
2 ratio of at least about 50.

[illegible]